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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,204	03/26/2004	Daryl Chapman	GP-302076	1948

7590 01/30/2007

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EXAMINER	
LEWIS, BEN	
ART UNIT	PAPER NUMBER
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/811,204	CHAPMAN ET AL.	
	Examiner	Art Unit	
	Ben Lewis	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *6,7,11-13,18-21 and 23-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 8-10, 14-17 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/4/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I, claims 1-5, 8-10, 14-17 and 22 which read on figure 1 in Paper filed December 18th, 2006 is acknowledged. The traversal is on the ground(s) that no serious burden on the examiner to search the four distinct inventions. This is not found persuasive because regardless of search method, inventions of different limitations will require different search strategies, and the times to consider the relevancy of collective references would increase proportionally as well. The requirement is still deemed proper and is therefore made FINAL. Therefore, claims 6-7, 11-13, 18-21 and 23-30 are withdrawn from consideration

Claim Rejections - 35 USC § 102

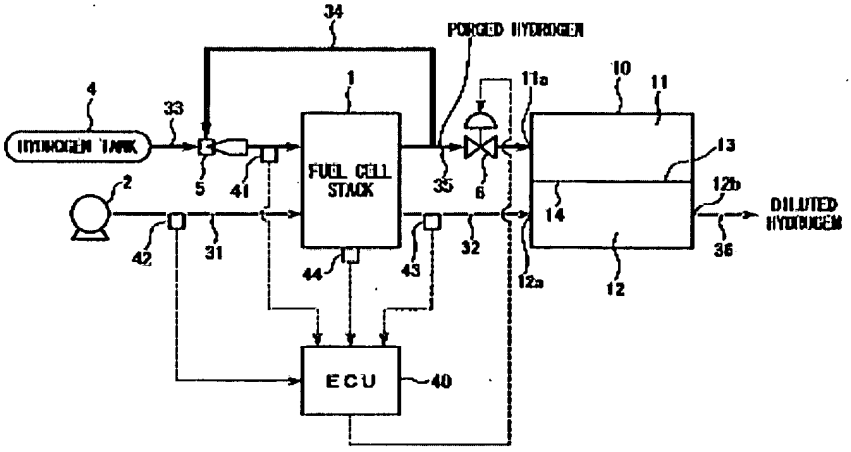
1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 4, 5 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Ueda et al. (U.S. Pub. No. 2004/0013919 A1).

With respect to claims 1 and 22, Ueda et al. disclose a hydrogen purge control apparatus (title), wherein air is pressurized by compressor **2** to a predetermined pressure, and the pressurized air is supplied to the cathode of each of the fuel cell units of the fuel cell stack **1** through an air supply passage **31** (Paragraph 0036). On the other hand, hydrogen gas supplied from a hydrogen tank **4** is supplied to the anode of the fuel cell stack **1** through a hydrogen gas supply passage **33** (Paragraph 0037). Ueda et al. also teach that a hydrogen gas purging passage **35** "anode exhaust", which includes a purge valve **6**, branches off the hydrogen gas circulating flow path **34**. The hydrogen gas purging passage **35** is connected to the purged hydrogen dilution device **10**. Note that the purge valve 6 may be substituted by one of various types of Regulators (Paragraph 0038). The purged hydrogen dilution device **10** is a container whose interior is divided by a partition **13** into a holding chamber **11** "accumulator" and a dilution chamber **12** (Paragraph 0039) (See Fig. 1).

FIG. 1



With respect to claims 4 and 5, Ueda et al. teach that during the purging operation in which the purge valve **6** is opened, hydrogen gas purged from the fuel cell stack **1** flows into the holding chamber **11**, and diffuses in the entirety of the holding chamber **11**. When the purge valve **6** is closed, flow of hydrogen gas into the holding chamber **11** is stopped. On the other hand, because the discharged air flows through the dilution chamber **12** regardless of opening and shutting of the purge valve **6**, hydrogen gas remaining in the holding chamber **11** is gradually drawn into the dilution chamber **12** through the communication holes **14**, and is mixed with the discharged air in dilution chamber **12** so as to be diluted. As result, it is possible to lower the hydrogen concentration of the gas discharged from the outlet **12b** of the dilution chamber **12** (Paragraph 0044).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al. (U.S. Pub. No. 2004/0013919 A1) in view of Pratt et al. (U.S. Patent No. 6,426,158 B1)

With respect to claim 2, Ueda et al. disclose a hydrogen purge control apparatus (title) in paragraph 2 above. Ueda et al. do not specifically teach a bleed vale selectively bleeding the anode exhaust gas accumulated in the accumulator. However, Pratt et al. discloses a method of diluting hydrogen gas exhausted from a fuel cell (title) wherein in FIG. 3, the hydrogen dilution means **16** "accumulator" consists of an empty holding chamber and an additional valve **30**. In a purging operation, the first valve **14** momentarily opens to release some pressurized reacted fuel gas into the holding chamber, which is initially at atmospheric pressure. The reacted fuel gas is then slowly released or bled into the air by partially opening or pulsing the second valve **30**, so that any hydrogen that is released is at a very small amount, thus keeping the concentration of hydrogen in the surrounding air at less than 4.1% (Col 4 lines 1-15). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the bleed valve on Pratt et al. into the fuel cell system of Ueda et al. because Pratt et al. teach that release of hydrogen into the open air may create a safety hazard if the concentration of hydrogen is above four (4) percent by volume. It would be an advancement in the art of fuel cell systems to have a dead-ended system that can be purged without constituting a safety hazard (Col 2 lines 20-35).

With respect to claim 3, Ueda et al. teach that in a purging operation, the first valve **14** momentarily opens to release some pressurized reacted fuel gas into the holding chamber, which is initially at atmospheric pressure. The reacted fuel gas is then slowly released or bled into the air by partially opening or pulsing the second valve **30**, so that any hydrogen that is released is at a very small amount, thus keeping the concentration of hydrogen in the surrounding air at less than 4.1% (Col 4 lines 1-15).

5. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al. (U.S. Pub. No. 2004/0013919 A1) in view Pratt et al. (U.S. Patent No. 6,426,158 B1) as applied to claim 2 above and further in view of Voss (U.S. Pub. No. 2003/0118882 A1).

With respect to claims 8-9, Ueda et al. as modified by Pratt et al. disclose a hydrogen purge control apparatus (title), wherein the hydrogen gas purging passage **35**, which includes a purge valve **6**, which branches off the hydrogen gas circulating flow path **34**. The hydrogen gas purging passage **35** is connected to the purged hydrogen dilution device **10**. Note that the purge valve **6** may be substituted by one of various types of Regulators (Paragraph 0038).

Ueda et al. as modified by Pratt et al. do not disclose wherein the bleed valve is a spring-based solenoid valve. However, Voss disclose a fuel cell system wherein the pressure control mechanism **2** has at least two fuel stream pressure settings, for example sub-atmospheric and super-atmospheric. In normal operation and in response to a signal from the controller, the pressure control mechanism **2** (for example, a

pressure regulator) maintains fuel at sub-atmospheric pressure. In response to a signal from the monitoring cell **12** to the controller **10** indicating the accumulation of a high concentration of diluent gases in the monitoring cell, a control signal activates the exhaust valve **9**, for example a solenoid, and adjusts the spring compression within the regulator to modify its control pressure to super-atmospheric. In the event of an interruption in power to the regulator, the normal feed pressure would be sub-atmospheric (Paragraph 0056).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute a spring-based solenoid controlled valve of Voss for the bleed valve of Ueda et al. as modified by Pratt et al. because a spring based solenoid valve can automatically adjust the opening of the exhaust valve which would lead to more efficient system performance.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al. (U.S. Pub. No. 2004/0013919 A1) in view of Voss (U.S. Pub. No. 2003/0118882 A1).

With respect to claim 10, Ueda et al. disclose a hydrogen purge control apparatus (title), wherein the hydrogen gas purging passage **35**, which includes a purge valve **6**, which branches off the hydrogen gas circulating flow path **34**. The hydrogen gas purging passage **35** is connected to the purged hydrogen dilution device **10**. Note that the purge valve **6** may be substituted by one of various types of Regulators (Paragraph 0038).

Ueda et al. as modified by Pratt et al. do not disclose wherein the purge valve is a spring-based solenoid valve. However, Voss disclose a fuel cell system wherein the pressure control mechanism **2** has at least two fuel stream pressure settings, for example sub-atmospheric and super-atmospheric. In normal operation and in response to a signal from the controller, the pressure control mechanism **2** (for example, a pressure regulator) maintains fuel at sub-atmospheric pressure. In response to a signal from the monitoring cell **12** to the controller **10** indicating the accumulation of a high concentration of diluent gases in the monitoring cell, a control signal activates the exhaust valve **9**, for example a solenoid, and adjusts the spring compression within the regulator to modify its control pressure to super-atmospheric. In the event of an interruption in power to the regulator, the normal feed pressure would be sub-atmospheric (Paragraph 0056).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute a spring-based solenoid controlled valve of Voss for the purge valve of Ueda et al. as modified by Pratt et al. because a spring based solenoid valve can automatically adjust the opening of the exhaust valve which would lead to more efficient system performance.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country; more than one year prior to the date of application for patent in the United States.

8. Claims 1,14 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Pratt et al. (U.S. Patent No. 6,426,158 B1).

With respect to claims 1 and 14, Pratt et al. disclose a method of diluting hydrogen gas exhausted from a fuel cell (title) wherein, a typical fuel cell **10** has two sides, an anode (or fuel) side and a cathode (or air) side. In addition to the anode and cathode, there are also current collectors, catalysts, a polymer electrolyte membrane, gas manifolds "anode and cathode inlet and outlet lines", fuel storage reservoir **12**, etc. disposed appropriately (Col 3 lines 1-15). Pratt et al. also teach that depicted in FIG. 3, the hydrogen dilution means **16** "accumulator" consists of an empty holding chamber and an additional valve **30**. In a purging operation, the first valve **14** momentarily opens to release some pressurized reacted fuel gas into the holding chamber, which is initially at atmospheric pressure. The reacted fuel gas is then slowly released or bled into the air by partially opening or pulsing the second valve **30**, so that any hydrogen that is released is at a very small amount, thus keeping the concentration of hydrogen in the surrounding air at less than 4.1% (Col 4 lines 1-15).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al. (U.S. Pub. No. 2004/0013919 A1) in view Pratt et al. (U.S. Patent No. 6,426,158 B1) as applied to claim 2 above and further in view of Voss (U.S. Pub. No. 2003/0118882 A1).

With respect to claims 15-16, Pratt et al. disclose a hydrogen purge control apparatus (title), wherein the hydrogen gas purging passage **35**, which includes a purge valve **6**, which branches off the hydrogen gas circulating flow path **34**. The hydrogen gas purging passage **35** is connected to the purged hydrogen dilution device **10**. Note that the purge valve **6** may be substituted by one of various types of Regulators (Paragraph 0038).

Pratt et al. do not disclose wherein the bleed valve is a spring-based solenoid valve. However, Voss disclose a fuel cell system wherein the pressure control mechanism **2** has at least two fuel stream pressure settings, for example sub-atmospheric and super-atmospheric. In normal operation and in response to a signal from the controller, the pressure control mechanism **2** (for example, a pressure regulator) maintains fuel at sub-atmospheric pressure. In response to a signal from the monitoring cell **12** to the controller **10** indicating the accumulation of a high concentration of diluent gases in the monitoring cell, a control signal activates the exhaust valve **9**, for example a solenoid, and adjusts the spring compression within the regulator to modify its control pressure to super-atmospheric. In the event of an

interruption in power to the regulator, the normal feed pressure would be sub-atmospheric (Paragraph 0056).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute a spring-based solenoid controlled valve of Voss for the bleed valve of Pratt et al. because a spring based solenoid valve can automatically adjust the opening of the exhaust valve which would lead to more efficient system performance.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pratt et al. (U.S. Patent No. 6,426,158 B1) in view of Ueda et al. (U.S. Pub. No. 2004/0013919 A1).

With respect to claim 17, Pratt et al. disclose a method of diluting hydrogen gas exhausted from a fuel cell (title) wherein the hydrogen gas purging passage **35**, which includes a purge valve **6**, which branches off the hydrogen gas circulating flow path **34**. The hydrogen gas purging passage **35** is connected to the purged hydrogen dilution device **10**. Note that the purge valve **6** may be substituted by one of various types of Regulators (Paragraph 0038).

Pratt et al. do wherein the bled anode exhaust gas from the bleed valve is combined with the cathode exhaust gas in the cathode exhaust gas line. However, Ueda et al. disclose a hydrogen purge control apparatus (title), wherein during the purging operation in which the purge valve **6** is opened, hydrogen gas purged from the fuel cell stack **1** flows into the holding chamber **11**, and diffuses in the entirety of the

holding chamber **11**. When the purge valve **6** is closed, flow of hydrogen gas into the holding chamber **11** is stopped. On the other hand, because the discharged air flows through the dilution chamber **12** regardless of opening and shutting of the purge valve **6**, hydrogen gas remaining in the holding chamber **11** is gradually drawn into the dilution chamber **12** through the communication holes **14**, and is mixed with the discharged air in dilution chamber **12** so as to be diluted. As result, it is possible to lower the hydrogen concentration of the gas discharged from the outlet **12b** of the dilution chamber **12** (Paragraph 0044). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the dilution of the anode gas with the cathode gas operation of Ueda et al. into the system of Pratt et al. because dilution of hydrogen by the cathode gas would result in a safer exhaust gas with lower hydrogen concentration.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER

Patent Examiner
Art Unit 1745